ABSTRACT

The present invention is a micro-cavity laser and methods related thereto. In the preferred embodiments, the micro-cavity laser comprises a laser pump signal in a fiber waveguide which is optically coupled to a micro-cavity resonator through a fiber taper. The micro-resonator includes a gain medium necessary for lasing action. The lasing frequency can be determined based upon the gain medium, the micro-cavity structure, as well as frequency selective elements such as gratings incorporated into the micro-cavity. The tapered fiber waveguide permits the micro-cavity laser to operate without a break in the fiber waveguide. In the preferred embodiments, the micro-cavity resonator is constructed from a doped silica or a semiconductor material. The present invention provides a compact laser with improved emissions and coupling efficiencies. Alternative configurations include multiple micro-cavities on a single fiber waveguide and/or utilizing multiple waveguides attached to one or more micro-cavity resonators. The laser can be made to operate in a continuous-wave as opposed to self-pulsing mode.